AMENDMENT

(Amendment by Provision of the Law Article 11)

To : Examiner of the Patent Office

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1. Identification of the International Application
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4. Object of Amendment Specification and Claims

5. Details of the Amendment
(1) In Specification page 3, lines 18 – 22 (English translation p.4 [0009] lines 3 – 9), "a first aspect of a photocatalyst sheet of the present invention is characterized in that it is the photocatalyst sheet on one side or both sides of the surfaces of which apatite-coated photocatalyst particles are fixed, and at

least one side of its surfaces on which parts of said photocatalyst sheets are mutually overlapped and welded is made of a material thermally weldable to said apatite-coated photocatalyst particles." is amended to

-- a first aspect of a photocatalyst sheet of the present invention is characterized in that it is the photocatalyst sheet comprising a substrate made of synthetic fiber, a coated layer made of a resin or a rubber coated on both sides of said substrate, and a photocatalyst-containing layer coated on at least one side of said coated layer, said photocatalyst-containing layer contains a resin or a rubber and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(2) In Specification, page 3, lines 23 – 28 (English translation p.4 [0009] lines 10 – 17), "Also, the invention as set forth in claim 2 is characterized in that it is the photocatalyst sheet comprising apatite-coated photocatalyst particles and a substrate on one side or both sides of the surfaces of which are fixed said photocatalyst particles, at least one side of its surfaces on which parts of said photocatalyst sheets mutually overlapped and welded is made of a material thermally weldable to the apatite-coated photocatalyst fine particles, and the ratio of the apatite-coated photocatalyst fine particles to said thermally weldable material is 10 – 40 weight %." is amended to

-- The invention as set forth in claim 2 is characterized in that it is the photocatalyst sheet comprising a substrate made of polyester fiber, a coated layer made of vinyl chloride resin coated on both sides of said substrate, and a photocatalyst-containing layer coated on at least one side of said coated layer, said photocatalyst-containing layer contains vinyl chloride and acrylic resins and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to the photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(3) In Specification, page 3, line 29 – p.3/1, line 5 (English translation p.4 [0009] lines 18 – 25), "A second aspect of a photocatalyst sheet of the present invention is characterized in that it comprises: a substrate and coated layers coated on

one side or both sides of said substrate, and said coated layers are made the photocatalyst-containing layers by fixing apatite-coated photocatalyst particles, the ratio of the apatite-coated photocatalyst fine particles to said photocatalyst-containing layer is 10 – 40 weight %, and the coated layer is peeled off the substrate when the photocatalyst sheets are mutually thermally welded and their welded part is peeled at the rate of 50 mm/min." is amended to

-- A second aspect of a photocatalyst sheet of the present invention is characterized in that it comprises a substrate made of inorganic fiber, coated layers made of a fluorocarbon resin coated on both sides of said substrate, and a photocatalyst-containing layers coated on at least one side of said coated layer, said photocatalyst-containing layers contain a fluorocarbon resin and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(4) In Specification, page 3/1, line 6 – page 4, line 6 (English translation p.4 [0009] lines 26 – to p.4/1 line 1), "A third aspect of a photocatalyst sheet of the present invention is characterized in that it comprises: a substrate, a first coated layer coated on one side or both sides of said substrate, and a second coated layer coated on at least one side of said first coated layers, said second coated layer is the photocatalyst-containing layer on which apatite-coated photocatalyst particles are fixed, the ratio of said apatite-coated photocatalyst fine particles to said photocatalyst-containing layer is 10 – 40 weight %, and said first and second coated layers are peeled off said substrate when said photocatalyst sheets are mutually thermally welded and said welded part is peeled at the rate of 50 mm/min." is amended to

-- A third aspect of a photocatalyst sheet of the present invention is characterized in that it comprises: a substrate made of glass fiber, a coated layer made of PTFE coated on both sides of said substrate, and a photocatalyst-containing layer coated on at least one side of said coated layer, said photocatalyst-containing layer contains a fluorocarbon resin being either one of PTFE, FEP, or PFA and apatite-coated photocatalyst particles, the ratio of the apatite-coated photocatalyst particles to said photocatalyst-containing

layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(5) In Specification, page 4, lines 17 – 22 (English translation p.5 [0009] lines 6 – 12), "Said substrate is preferably made of such natural fiber as kenaf or jute or others, such synthetic fiber as polyamide fiber, polyaramide fiber, polyester fiber, polyvinyl chloride fiber, polyvinylidene chloride fiber, acrylic fiber, polyvinyl alcohol fiber, polypropylene fiber, polyethylene fibers or others, or such inorganic fibers as glass fiber, silica fiber, or basalt fiber or others." is amended to

-- Said substrate is preferably made of such synthetic fiber as polyamide fiber, polyaramide fiber, polyester fiber, polyvinyl chloride fiber, polyvinylidene chloride fiber, acrylic fiber, polyvinyl alcohol fiber, polypropylene fiber, polyethylene fibers or others. Said substrate may also be such inorganic fiber as glass fiber, silica fiber, or basalt fiber or others. --

(6) In Specification, page 5, lines 21 – 29 (English translation p.6 [0010] lines 17 – 29), "On the other hand, a method of welding the photocatalyst sheets of the present invention is the welding method of the second or the third aspect of the photocatalyst sheet of the present invention, characterized in that said apatite-coated photocatalyst fine particles are fixed with resin or rubber constituting said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, said first and second coated layers are peeled off said substrate when the welding surfaces are held together and mutually welded without removing photocatalyst-containing layers of the photocatalyst sheets, and said welded part is peeled at the rate of 50 mm/min. Especially, preferable welding is by thermal adhesion of resin or rubber located on said welding surfaces." is amended to

-- On the other hand, a method of welding the photocatalyst sheets of the present invention is characterized in that said photocatalyst sheet comprises a substrate made of polyester fiber, coated layers made of polyvinyl chloride coated on both sides of said substrate, and photocatalyst-containing layers coated on at least one side of said coated layer, said photocatalyst-containing

layers contain polyvinyl chloride and acrylic resins, and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when the welding surfaces are held together and mutually welded without removing photocatalyst-containing layers of said photocatalyst sheets, thereby said photocatalyst sheets are mutually thermally welded.

A second method of welding the photocatalyst sheets of the present invention is characterized in that the photocatalyst sheet comprises a substrate made of glass fiber, first coated layers made of PTFE coated on both sides of said substrate, and photocatalyst-containing layers coated on at least one side of said first coated layer, said photocatalyst-containing layers contain fluorocarbon resin being either one of PTFE, FEP, or PFA, and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when the welding surfaces are held together and mutually welded without removing photocatalyst-containing layers of said photocatalyst sheets, thereby said photocatalyst sheets are mutually thermally welded. It is particularly preferable to thermally weld the resins present on said welding surfaces. --

(7) In Specification, page 6, lines 1 – 2 (English translation p.6/1 [0010] line 2), "resin or rubber" is amended to -- resin --

(8) In Specification, page 6, lines 4 – 13 (English translation p.6/1 [0011] lines 3 – 18), "The method of manufacturing photocatalyst sheets of the present invention is the method of manufacturing photocatalyst sheets comprising a substrate and a coated layer coated on one side or both sides of said substrate, and at least one side of the outermost layers of the coated layer is made the photocatalyst-containing layer by fixing the apatite-coated photocatalyst particles, characterized in that the photocatalyst-containing layer is made of resin or rubber, the photocatalyst-containing layer is formed by coating the dispersion containing the apatite-coated photocatalyst particles, the apatite-coated photocatalyst fine particles are fixed with the resin or rubber constituting said photocatalyst-containing layer, the ratio of said apatite-coated

photocatalyst fine particles to the photocatalyst-containing layer is 10 – 40 weight %, and the first and the second coated layers are peeled off the substrate when the photocatalyst sheets are mutually thermally welded and said welded part is peeled at the rate of 50 mm/min." is amended to

-- The method of manufacturing photocatalyst sheets of the present invention is the method of manufacturing photocatalyst sheets comprising a substrate made of polyester fiber and a coated layer made of polyvinyl chloride coated on both sides of said substrate, and at least one side of the outermost layers of said coated layer is made the photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that said photocatalyst-containing layer is made of polyvinyl chloride and acrylic resin, said photocatalyst-containing layer is formed by coating the dispersion containing said apatite-coated photocatalyst particles, said apatite-coated photocatalyst fine particles are fixed with the polyvinyl chloride and acrylic resin constituting said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(9) In Specification, page 6, lines 14 – 23 (English translation page 7 [0011] lines 1 – 16), "The method of manufacturing photocatalyst sheets of the present invention is also the method of manufacturing said photocatalyst sheets comprising a substrate and a coated layer on one side or both sides of said substrate, and at least one side of the outermost layers of the coated layer is made the photocatalyst-containing layer by fixing the apatite-coated photocatalyst particles, characterized in that said photocatalyst-containing layer is made of resin or rubber, said photocatalyst-containing layer is formed by making a sheet of the resin or rubber containing the apataite-coated photocatalyst particles, and by laminating said sheet of the photocatalyst-containing layer on to at least one side of the outermost layers of said coated layer, the ratio of said apatite-coated photocatalyst particles to the photocatalyst-containing layer is 10 – 40 weight %, and the first and the second coated layers are peeled off the substrate when the photocatalyst sheets are mutually thermally welded and said welded part is peeled at the rate of 50 mm/min." is amended to

-- The method of manufacturing photocatalyst sheets of the present invention is also the method of manufacturing photocatalyst sheets comprising a substrate made of glass fiber and a coated layer made of PTFE on both sides of said substrate, and at least one side of the outermost layers of said coated layer is made the photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that said photocatalyst-containing layer is made of a fluorocarbon resin being either one of PTFE, FEP, or PFA, said photocatalyst-containing layer is formed by coating the dispersion containing the apataite-coated photocatalyst particles, said apatite-coated photocatalyst particles is fixed with said fluorocarbon resin constituting said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(10) In Specification, page 6, line 24 – p.6/1, line 2 (English translation page 7 [0011] line 17 – 25), "In the above-mentioned method of manufacturing, the dispersion preferably comprises resin or rubber, the apatite-coated photocatalyst particles, and organic solvent, and in said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said resin or rubber to fix the apatite-coated photocatalyst particles is 10 - 40 weight%. Also preferably said dispersion comprises resin or rubber, the apatite-coated photo-catalyst particles, and water, and in said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to the resin or rubber to fix the apatite-coated photocatalyst particles is 10 - 40 weight%." is amended to

-- In the above-mentioned method of manufacturing, the dispersion preferably comprises polyvinyl chloride and acrylic resins, the apatite-coated photocatalyst particles, and organic solvent. Also preferably the dispersion comprises said fluorocarbon resin being either one of PTFE, FEP, or PFA, apatite-coated photocatalyst particles, and water. --

(11) In Claims, page 23, Claim 1 (English translation Claims, page 28, Claim 1),
"1. A photocatalyst sheet on one side or both sides of the surfaces of which apatite-coated photocatalyst particles are fixed, characterized in that

at least one side of its surfaces to be welded with a part of said photocatalyst sheets mutually overlapped and welded is made of a material thermally weldable.to said apatite-coated photocatalyst particles." is amended to

-- 1. A photocatalyst sheet comprising;

a substrate made of synthetic fiber,

a coated layer made of a resin or a rubber coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that; said photocatalyst-containing layer contains;

a resin or a rubber, and

apatite-coated photocatalyst particles,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(12) In Claims, page 23, Claim 2 (English translation Claims, page 28, Claim 2),

"2. A photocatalyst sheet comprising apatite-coated photocatalyst particles and a substrate on one side or both sides of the surfaces of which are fixed said photocatalyst particles, characterized in that

at least one side of its surfaces to be mutually overlapped and welded with a part of said photocatalyst sheets is made of a material thermally weldable to the apatite-coated photocatalyst fine particles , and the ratio of said apatite-coated photocatalyst fine particles to said thermally weldable material is 10 – 40 weight%." is amended to

-- 2. A photocatalyst sheet comprising;

a substrate made of polyester fiber,

a coated layer made of polyvinyl chloride resin coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that; said photocatalyst-containing layer contains;

polyvinyl chloride resin and acrylic resin, and

apatite-coated photocatalyst particles,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(13) In Claims, page 23, Claim 3 (English translation Claims, page 28, Claim 3),
"3. A photocatalyst sheet comprising a substrate and coated layers coated on one side or both sides of said substrate, characterized in that

said coated layers are the photocatalyst-containing layers on which apatite-coated photocatalyst particles are fixed, the ratio of said apatite-coated photocatalyst fine particles to said photocatalyst-containing layers is 10 – 40 weight %, and said coated layers are peeled off said substrate when the photocatalyst sheets are mutually thermally welded and said welded part is peeled at the rate of 50 mm/min." is amended to
-- 3. A photocatalyst sheet comprising;

a substrate made of inorganic fiber,

a coated layer made of fluorocarbon resin coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that; said photocatalyst-containing layer contains;

fluorocarbon resin and apatite-coated photocatalyst particles,
the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and
the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(14) In Claims, page 23, Claim 4 (English translation Claims, pages 28 – 28/1, Claim 4),
"4. A photocatalyst sheet comprising a substrate; a first coated layer coated on one side or both sides of said substrate; and a second coated layer coated on at least one side of said first coated layer, characterized in that

said second coated layer is the photocatalyst-containing layer on which apatite-coated photocatalyst particles are fixed, the ratio of said apatite-coated photocatalyst fine particles to said photocatalyst-containing layer is 10 – 40 weight %, and said first and second coated layers are peeled off said substrate when the photocatalyst sheets are mutually thermally welded and said welded part is peeled at the rate of 50 mm/min." is amended to
-- 4. A photocatalyst sheet comprising a substrate made of glass fiber, a coated layer

made of PTFE coated on both sides of said substrate; and a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that

said photocatalyst-containing layer contains fluorocarbon resin being either one of PTFE, FEP, or PFA and apatite-coated photocatalyst particles,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(15) In Claims, page 23/1, Claim 5, lines 2 – 3 (English translation Claims, page 28/1, Claim 5, line 1),
"claim 3 or 4" is amended to -- any one of claims 1 – 4 --

(16) In Claims, page 24, Claim 10 (English translation Claims, page 29, Claim 10),
"10. The photocatalyst sheet as set forth in claim 3 or 4, characterized in that said substrate is made of either of such natural fibers as kenaf or jute or others, such synthetic fibers as polyamide fiber, polyaramide fiber, polyester fiber, polyvinyl chloride fiber, polyvinylidene chloride fiber, acrylic fiber, polyvinyl alcohol fiber, polypropylene fiber, polyethylene fiber, and others, or such inorganic fibers as glass fiber, silica fiber, basalt fiber, and others." is amended to
-- 10. The photocatalyst sheet as set forth in Claim 1, characterized in that said substrate is made of either of such synthetic fibers as polyamide fiber, polyaramide fiber, polyester fiber, polyvinyl chloride fiber, polyvinylidene chloride fiber, acrylic fiber, polyvinyl alcohol fiber, polypropylene fiber, polyethylene fiber, and others. --

(17) In Claims, page 24, Claim 11, line 2 (English translation Claims, page 29, Claim 11, line 1),
"claim 3 or 4" is amended to -- claim 1 --

(18) In Claims, page 24, Claim 13, line 8 (English translation Claims, page 30, Claim 13, line 1),
"claim 11" is amended to -- claim 1 or 11 --

(19) In Claims, pages 24 – 25, Claim 14, line 5 (English translation Claims, page 30, Claim 14, line 1),

"claim 13" is amended to -- claim 3 --

(20) In Claims, page 25, Claim 15 (English translation Claims, page 30 and 30/1, Claim 15),

"15. A method of welding photocatalyst sheets, characterized in that said photocatalyst sheet comprises a substrate and coated layers coated on one side or both sides of said substrate, and

said coated layers are the photocatalyst-containing layers on which apatite-coated photocatalyst particles are fixed, or

said photocatalyst sheet comprises a substrate; a first coated layer coated on one side or both sides of said substrate; and a second coated layer coated on said first coated layer,

said second coated layer is the photocatalyst-containing layer on which apatite-coated photocatalyst particles are fixed,

said apatite-coated photocatalyst fine particles are fixed with resin or rubber constituting said photocatalyst-containing layer,

the ratio of said apatite-coated photocatalyst fine particles to said photocatalyst-containing layer is 10 – 40 weight %,

the surfaces to be welded of said photocatalyst sheets are mutually fitted without removing said photocatalyst-containing layers and welded together, and

said first and second coated layers are peeled off said substrate when the photocatalyst sheets are mutually thermally welded and said welded part is peeled at the rate of 50 mm/min." is amended to

-- 15. A method of welding photocatalyst sheets comprising

a substrate made of polyester fiber,

coated layers made of polyvinyl chloride coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that

said photocatalyst-containing layer contains polyvinyl chloride and acrylic resins, with apatite-coated photocatalyst particles fixed thereon,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %,

the surfaces to be welded of said photocatalyst sheets are mutually

fitted without removing photocatalyst-containing layers and welded together, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(21) In Claims, page 25, Claim 16 (English translation Claims, page 30/1, Claim 16), "16. The method of welding photocatalyst sheets as set forth in claim 15, characterized in that it is the method of mutually welding the resin or rubber present on said surface to be welded by thermal adhesion." is amended to

-- 16. The method of welding photocatalyst sheets comprising

a substrate made of glass fiber,

first coated layers made of PTFE coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said first coated layer,

characterized in that

said photocatalyst-containing layer contains a fluorocarbon resin being either one of PTFE, FEP, or PFA, with apatite-coated photocatalyst particles fixed thereon,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %,

the surfaces to be welded of said photocatalyst sheets are mutually fitted without removing photocatalyst-containing layers and welded together, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(22) In Claims, pages 25 – 26, Claim 18 (English translation Claims, page 31, Claim 18), "18. A method of manufacturing photocatalyst sheets comprising a substrate and a coated layer on one side or both sides of said substrate and at least one side of the outermost layers of said coated layer being made the photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that

said photocatalyst-containing layer is made of resin or rubber,

said photocatalyst-containing layer is formed by coating the dispersion containing said apatite-coated photocatalyst particles,

said apatite-coated photocatalyst fine particles are fixed with the resin or rubber constituting said photocatalyst-containing layer,

the ratio of said apatite-coated photocatalyst fine particles to said photocatalyst-containing layer is 10 – 40 weight %, and

said first and second coated layers are peeled off said substrate when the photocatalyst sheets are mutually thermally welded and said welded part is peeled at the rate of 50 mm/min." is amended to

-- 18. A method of manufacturing photocatalyst sheets comprising

a substrate made of polyester fiber and

coated layers made of polyvinyl chloride coated on both sides of said substrate, and the outermost layer of at least one side of said coated layer is made a photocatalyst-containing layer by fixing apatite-coated photocatalyst particles,

characterized in that

said photocatalyst-containing layer contains polyvinyl chloride resin and acrylic resin,

said photocatalyst-containing layer is formed by coating the dispersion containing apatite-coated photocatalyst particles,

said apatite-coated photocatalyst particles are fixed with polyvinyl chloride resin and acrylic resin which constitute said photocatalyst-containing layer,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(23) In Claims, page 26, Claim 19 (English translation Claims, page 31, Claim 19),
"19. A method of manufacturing photocatalyst sheets comprising a substrate and a coated layer on one side or both sides of said substrate, and at least one side of the outermost layers of said coated layer being made the photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that

said photocatalyst-containing layer is made of resin or rubber, said photocatalyst-containing layer is formed by making a sheet of resin or rubber containing said apatite-coated photocatalyst particles, laminating the sheet of photocatalyst-containing layer on at least one side of the outermost layers of said coated layer, the ratio of said apatite-coated photocatalyst fine particles to said photocatalyst-containing layer is 10 – 40 weight %, and said first and second coated layers are peeled off said substrate when the photocatalyst sheets are mutually thermally welded and said welded part is peeled at the

rate of 50 mm/min." is amended to

-- 19. A method of manufacturing photocatalyst sheets comprising

a substrate made of glass fiber and

coated layers made of PTFE coated on both sides of said substrate, and

the outermost layer of at least one side of said coated layer is made a photocatalyst-containing layer by fixing apatite-coated photocatalyst particles,

characterized in that

said photocatalyst-containing layer contains fluorocarbon resin being either one of PTFE, FEP, or PFA,

said photocatalyst-containing layer is formed by coating the dispersion containing apatite-coated photocatalyst particles,

said apatite-coated photocatalyst particles are fixed with said fluorocarbon resin which constitutes said photocatalyst-containing layer,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded. --

(24) In Claims, page 26, Claim 20 (English translation Claims, page 31 and 31/1, Claim 20),

"20. A method of manufacturing photocatalyst sheets as set forth in claim 18, characterized in that said dispersion comprises resin or rubber, the apatite-coated photocatalyst particles, and organic solvents, and in said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said resin or rubber to fix the apatite-coated photocatalyst particles is 10 - 40 weight%." is amended to

-- 20. The method of manufacturing photocatalyst sheets as set forth in claim 18, characterized in that said dispersion comprises polycinyl chloride resin and acrylic resin, the apatite-coated photocatalyst particles, and organic solvents. --

(25) In Claims, pages 26 – 26/1, Claim 21 (English translation Claims, page 31/1, Claim 21),

"21. A method of manufacturing photocatalyst sheets as set forth in claim 18, characterized in that said dispersion comprises resin or rubber, the apatite-coated photocatalyst particles, and water, and in said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said resin or rubber to fix the apatite-coated

photocatalyst particles is 10 - 40 weight%." is amended to
-- 21. The method of manufacturing photocatalyst sheets as set forth in claim 19, characterized in that said dispersion comprises fluorocarbon resin being either one of said PTFE, FEP, or PFA, the apatite-coated photocatalyst particles, and water. --

(26) After Claims, pages 26/1, Claim 21 (English translation Claims, page 31/1, Claim 21) are added Claims 22 and 23 as shown below.
-- 22. (added) The photocatalyst sheet as set forth in claim 3, characterized in that said substrate is made of glass fiber, silica fiber, basalt fiber, or other inorganic fiber. --

-- 23. (added) The welding method of photocatalyst sheets as set forth in claim 15 or 16, characterized in that the resins present on said surfaces to be welded are mutually thermally welded. --

6. List of Papers Attached:
(1) Specification, substitute sheet pages 3, 3/1, 4, 4/1, 5, 5/1, 6, 6/1 (English translation substitute sheet pages 4, 4/1, 5, 6, 6/1, and 7)
(2) Specification claim pages 23, 23/1, 24, 25, 26 and 26/1 (English translation pages 28, 28/1, 29, 30, 30/1, 31, and 31/1).

photocatalyst particles, mutual welding of sheets is easy, and the effect of photo-redox reaction of photocatalysts can be readily obtained.

[0009] In order to achieve the above-mentioned purpose, a first aspect of a photocatalyst sheet of the present invention is characterized in that it is the photocatalyst sheet comprising a substrate made of synthetic fiber, a coated layer made of a resin or a rubber coated on both sides of said substrate, and a photocatalyst-containing layer coated on at least one side of said coated layer, said photocatalyst-containing layer contains a resin or a rubber and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

The invention as set forth in claim 2 is characterized in that it is the photocatalyst sheet comprising a substrate made of polyester fiber, a coated layer made of vinyl chloride resin coated on both sides of said substrate, and a photocatalyst-containing layer coated on at least one side of said coated layer, said photocatalyst-containing layer contains vinyl chloride and acrylic resins and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to the photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

A second aspect of a photocatalyst sheet of the present invention is characterized in that it comprises a substrate made of inorganic fiber, coated layers made of a fluorocarbon resin coated on both sides of said substrate, and a photocatalyst-containing layers coated on at least one side of said coated layer, said photocatalyst-containing layers contain a fluorocarbon resin and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

A third aspect of a photocatalyst sheet of the present invention

is characterized in that it comprises: a substrate made of glass fiber, a coated layer made of PTFE coated on both sides of said substrate, and a photocatalyst-containing layer coated on at least one side of said coated layer, said photocatalyst-containing layer contains a fluorocarbon resin being either one of PTFE, FEP, or PFA and apatite-coated photocatalyst particles, the ratio of the apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

Said apatite-coated photocatalyst particles fixed in said photocatalyst containing layer preferably have parts exposed from the surface of said photocatalyst containing layer. Said apatite-coated photocatalyst particles are preferably the photocatalyst particles either a part of the surface of which is coated with apatite, or a whole surface of which is coated with porous apatite. Especially, the quantity of coating of apatite to be coated on said photocatalyst particles is preferably such that the weight loss ratio of whole of said photocatalyst sheet is 10% or less in case that the ultraviolet light of intensity 18 mW/cm^2 is irradiated for one

hour on the surface of said photocatalyst sheet. The photocatalyst particle is preferably either or both of an ultraviolet light responsive type and a visible light responsive type.

Said photocatalyst particle preferably contains titanium oxide, and said apatite is preferably either one of apatite hydroxide, apatite carbonate, apatite fluoride, or apatite chloride, or mixture thereof. Said substrate is preferably made of such synthetic fiber as polyamide fiber, polyaramide fiber, polyester fiber, polyvinyl chloride fiber, polyvinylidene chloride fiber, acrylic fiber, polyvinyl alcohol fiber, polypropylene fiber, polyethylene fibers or others. Said substrate may also be such inorganic fiber as glass fiber, silica fiber, or basalt fiber or others.

Said apatite-coated photocatalyst particles are preferably fixed with the resin or rubber constituting said photocatalyst-containing layer. Also, said resin is preferably either of polyvinyl chloride, polyethylene, polypropylene, ethylene-vinyl acetate copolymer, polyurethane, fluorocarbon resin, polystyrene, acrylonitrile-butadiene-styrene copolymer, polyamide, acrylic, polycarbonate, methylpentene resins, or the mixture thereof, and said rubber is preferably either of chloroprene, chlorosulfonated polyethylene, natural, butadiene, styrene, butyl, nitrile, acrylic, urethane, silicone, fluorocarbon, and ethylene-propylene rubbers. Especially, said fluorocarbon resin is preferably either of polytetrafluoro-ethylene (PTFE), tetrafluoroethylene-hexafluoropropylene copolymer (FEP), tetrafluoroethylene-perfluoro-alkylvinylether copolymer (PFA), polyvinyl fluoride (PVF) or polyvinylidene fluoride (PVDF).

With a photocatalyst sheet of the present invention, since resin or rubber is exposed on the surface of a photocatalyst-containing layer as the surface of a photocatalyst sheet, either direct thermal adhesion or welding with adhesive or double-stick tape is possible, and no particular process is required for mutual welding of photocatalyst sheets, thereby welding is quite easy. Also, since apatite-coated photocatalyst particles are dispersed and fixed on said photocatalyst-containing layer, the

photocatalytic function can be attained. Further, since photocatalyst particles are coated with apatite, the photocatalytic function is not extended to the materials other than the photocatalyst of a photocatalyst-containing layer, the first coated layer of the third aspect, and the substrate. That is, the substrate is hardly decomposed by photo-redox reaction. Especially in the third aspect, by locating the first coated layer made of the same material that in the photocatalyst-containing layer but the photocatalyst removed therefrom between the substrate and the second coated layer as the photocatalyst-containing layer, the photocatalyst-containing layer can be made thin, thereby the amount of apatite-coated photocatalyst particles fixed in the photocatalyst-containing layer can be much reduced. Also, since apatite-coated photocatalyst particles are used as photocatalyst particles, it is not necessary to use such hardly decomposing material as fluorocarbon resin and others. Here, however, apatite-coated photocatalyst particles may be fixed with fluorocarbon resin.

[0010] On the other hand, a method of welding the photocatalyst sheets of the present invention is characterized in that said photocatalyst sheet comprises a substrate made of polyester fiber, coated layers made of polyvinyl chloride coated on both sides of said substrate, and photocatalyst-containing layers coated on at least one side of said coated layer, said photocatalyst-containing layers contain polyvinyl chloride and acrylic resins, and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when the welding surfaces are held together and mutually welded without removing photocatalyst-containing layers of said photocatalyst sheets, thereby said photocatalyst sheets are mutually thermally welded.

A second method of welding the photocatalyst sheets of the present invention is characterized in that the photocatalyst sheet comprises a substrate made of glass fiber, first coated layers made of PTFE coated on both sides of said substrate, and photocatalyst-containing layers coated on at least one side of said first

coated layer, said photocatalyst-containing layers contain fluorocarbon resin being either one of PTFE, FEP, or PFA, and apatite-coated photocatalyst particles, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when the welding surfaces are held together and mutually welded without removing photocatalyst-containing layers of said photocatalyst sheets, thereby said photocatalyst sheets are mutually thermally welded. It is particularly preferable to thermally weld the resins present on said welding surfaces.

According to the method of welding the photocatalyst sheets of the present invention, the pre-step treatment as in prior arts to remove the photocatalyst layer of welding breadth, and to expose the resin layer on the surface is no longer necessary, thereby welding is quite easy. Especially in case of thermal adhesion, welding with sufficient welding strength is possible by making the ratio of apatite-coated photocatalyst particles to resin 10 - 40 weight %.

[0011] The method of manufacturing photocatalyst sheets of the present invention is the method of manufacturing photocatalyst sheets comprising a substrate made of polyester fiber and a coated layer made of polyvinyl chloride coated on both sides of said substrate, and at least one side of the outermost layers of said coated layer is made the photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that said photocatalyst-containing layer is made of polyvinyl chloride and acrylic resins, said photocatalyst-containing layer is formed by coating the dispersion containing said apatite-coated photocatalyst particles, said apatite-coated photocatalyst fine particles are fixed with the polyvinyl chloride and acrylic resin constituting said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

The method of manufacturing photocatalyst sheets of the present invention is also the method of manufacturing photocatalyst sheets comprising a substrate made of glass fiber and a coated layer made of PTFE on both sides of said substrate, and at least one side of the outermost layers of said coated layer is made the photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that said photocatalyst-containing layer is made of a fluorocarbon resin being either one of PTFE, FEP, or PFA, said photocatalyst-containing layer is formed by coating the dispersion containing the apataite-coated photocatalyst particles, said apatite-coated photocatalyst particles is fixed with said fluorocarbon resin constituting said photocatalyst-containing layer, the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

In the above-mentioned method of manufacturing, the dispersion preferably comprises polyvinyl chloride and acrylic resins, the apatite-coated photocatalyst particles, and organic solvent. Also preferably the dispersion comprises said fluorocarbon resin being either one of PTFE, FEP, or PFA, apatite-coated photocatalyst particles, and water.

According to the method of manufacturing photocatalyst sheets of the present invention, the photocatalyst-containing layer that contains apatite-coated photocatalysts on the outermost layer of the substrate can be easily formed by dispersion coating and other methods.

[0012] With photocatalyst sheets and method of manufacturing the same of the present invention, photocatalyst sheets can be easily obtained and welded mutually. Also, since apatite-coated photocatalyst particles are dispersed and fixed on said photocatalyst-containing layer, a substrate is

Claims:

What is claimed is:

1. (amended) A photocatalyst sheet comprising;

a substrate made of synthetic fiber,

a coated layer made of a resin or a rubber coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that; said photocatalyst-containing layer contains;

a resin or a rubber, and

apatite-coated photocatalyst particles,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

2. (amended) A photocatalyst sheet comprising;

a substrate made of polyester fiber,

a coated layer made of polyvinyl chloride resin coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that; said photocatalyst-containing layer contains;

polyvinyl chloride resin and acrylic resin, and

apatite-coated photocatalyst particles,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

3. (amended) A photocatalyst sheet comprising;

a substrate made of inorganic fiber,

a coated layer made of fluorocarbon resin coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that; said photocatalyst-containing layer contains;

fluorocarbon resin and apatite-coated photocatalyst particles,
the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and
the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

4. (amended) A photocatalyst sheet comprising a substrate made of glass fiber, a coated layer made of PTFE coated on both sides of said substrate; and a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that

said photocatalyst-containing layer contains fluorocarbon resin being either one of PTFE, FEP, or PFA and apatite-coated photocatalyst particles,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

5. (amended) The photocatalyst sheet as set forth in any one of claims 1 – 4, characterized in that the apatite-coated photocatalyst particles fixed in said photocatalyst containing layer have parts exposed from the surface of said photocatalyst containing layer.

6. The photocatalyst sheet as set forth in any one of claims 1 - 4, characterized in that said apatite-coated photocatalyst particles are the photocatalyst particles either a part of the surface of which is coated with apatite, or a whole surface of which is coated with porous apatite.

7. The photocatalyst sheet as set forth in claim 6, characterized in that the quantity of coating of apatite to be coated on said photocatalyst particles is such that the weight loss ratio of whole of said photocatalyst sheet is 10% or less in case that the ultraviolet light of intensity 18 mW/cm^2 is irradiated for one hour on the surface of said photocatalyst sheet.

8. The photocatalyst particle as set forth in any one of claims 1 - 4, characterized in that said photocatalyst sheet is either or both of an ultraviolet light responsive type and a visible light responsive type.

9. The photocatalyst sheet as set forth in any one of claims 1 - 4, characterized in that said photocatalyst particle contains titanium oxide, and said apatite is either of apatite hydroxide, apatite carbonate, apatite fluoride, or apatite chloride, or the mixture thereof.

10. (amended) The photocatalyst sheet as set forth in claim 1, characterized in that said substrate is made of either of such synthetic fibers as polyamide fiber, polyaramide fiber, polyester fiber, polyvinyl chloride fiber, polyvinylidene chloride fiber, acrylic fiber, polyvinyl alcohol fiber, polypropylene fiber, polyethylene fiber, and others.

11. (amended) The photocatalyst sheet as set forth in claim 1, characterized in that said apatite-coated photocatalyst particles are fixed with the resin or rubber constituting said photocatalyst-containing layer.

12.

13. (amended) The photocatalyst sheet as set forth in claim 1 or 11, characterized in that said resin is either of vinyl chloride, polyethylene, polypropylene, ethylene vinyl acetate copolymer, polyurethane, fluorocarbon, and polystyrene resins, acrylonitrile-butadiene-styrene copolymer, polyamide, acrylic, polycarbonate, methlpentene resins, or the mixture of these thereof and said rubber is either of chloroprene, polyethylenechlorosulfonatea, natural, butadiene, styrene, butyl, nitrile, acrylic, urethane, silicone, fluorocarbon, or ethylenepropylene rubbers .

14. (amended) The photocatalyst sheet as set forth in claim 3, characterized in that said fluorocarbon resin is either of polytetrafluoroethylene (PTFE), tetrafluoroethyolene-hexa-
fluoropropylene copolymer (FEP), tetrafluoroethylene-perfluoroalkylvinylether copolymer (PFA), polyvinyl fluoride (PVF), or polyvinylidene fluoride (PVDF).

15. (amended) A method of welding photocatalyst sheets comprising

a substrate made of polyester fiber,

coated layers made of polyvinyl chloride coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said coated layer, characterized in that

said photocatalyst-containing layer contains polyvinyl chloride and acrylic resins, with apatite-coated photocatalyst particles fixed thereon,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %,

the surfaces to be welded of said photocatalyst sheets are mutually fitted without removing photocatalyst-containing layers and welded together, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

16. (amended) The method of welding photocatalyst sheets comprising

a substrate made of glass fiber,

a first coated layers made of PTFE coated on both sides of said substrate, and

a photocatalyst-containing layer coated on at least one side of said first coated layer,characterized in that

said photocatalyst-containing layer contains a fluorocarbon resin being either one of PTFE, FEP, or PFA, with apatite-coated photocatalyst particles fixed thereon,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %,

the surfaces to be welded of said photocatalyst sheets are mutually fitted without removing photocatalyst-containing layers and welded together, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

17.

18. (amended) A method of manufacturing photocatalyst sheets comprising

a substrate made of polyester fiber and

coated layers made of polyvinyl chloride coated on both sides of said substrate, and the outermost layer of at least one side of said coated layer is made a photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that

said photocatalyst-containing layer contains polyvinyl chloride resin and acrylic resin,

said photocatalyst-containing layer is formed by coating the dispersion containing apatite-coated photocatalyst particles,

said apatite-coated photocatalyst particles are fixed with polyvinyl chloride resin and acrylic resin which constitute said photocatalyst-containing layer,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

19. (amended) A method of manufacturing photocatalyst sheets comprising

a substrate made of glass fiber and

coated layers made of PTFE coated on both sides of said substrate, and the outermost layer of at least one side of said coated layer is made a photocatalyst-containing layer by fixing apatite-coated photocatalyst particles, characterized in that

said photocatalyst-containing layer contains fluorocarbon resin being either one of PTFE, FEP, or PFA,

said photocatalyst-containing layer is formed by coating the dispersion containing apatite-coated photocatalyst particles,

said apatite-coated photocatalyst particles are fixed with said fluorocarbon resin which constitutes said photocatalyst-containing layer,

the ratio of said apatite-coated photocatalyst particles to said photocatalyst-containing layer is 10 – 40 weight %, and

the peeling rate of said welded part from said substrate is 50 mm/min when said photocatalyst sheets are mutually thermally welded.

20. (amended) The method of manufacturing photocatalyst sheets as set forth in claim 18, characterized in that said dispersion comprises polycinyl chloride resin and acrylic resin, the apatite-coated photocatalyst particles, and organic solvents.

21. (amended) The method of manufacturing photocatalyst sheets as set forth in claim 19, characterized in that said dispersion comprises fluorocarbon resin being either one of said PTFE, FEP, or PFA, the apatite-coated photocatalyst particles, and water.

22. (added) The photocatalyst sheet as set forth in claim 3, characterized in that said substrate is made of glass fiber, silica fiber, basalt fiber, or other inorganic fiber.

23. (added) The welding method of photocatalyst sheets as set forth in claim 15 or 16, characterized in that the resins present on said surfaces to be welded are mutually thermally welded.